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EXAMINER	
PATEL, JAY P	

ART UNIT	PAPER NUMBER
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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/748,306	LI ET AL.	
	Examiner	Art Unit	
	JAY P. PATEL	2419	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on 23 February 2009.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) 1,4-8,11-13,16-20,37,40 and 41 is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) 1,4-8,11-13,16-20,37,40 and 41 is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Claim Objections

Claim 40 is objected to because of the following informalities: Claim 40 depends on canceled claim 39. Appropriate correction is required.

Claim Rejections - 35 USC § 112

The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claims 8 and 19 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 8 and 19 recites the limitation "handshaking packet". There is insufficient antecedent basis for this limitation in the claim.

Claim Rejections - 35 USC § 101

35 U.S.C. 101 reads as follows:

> Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.

Claims 13, 16-20, 37 and 40-41 are rejected under 35 U.S.C. 101 because the claimed invention is directed to non-statutory subject matter.

Claims 13 and 37 mention the use of a storage medium. However, page 25 of the specification refers to memory as being e.g. memory including an electrical, optical, or electromagnetic conductor. Such conductor, can be propagated signals; which are non-statutory.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 1, 11-13, 37 and 41 are rejected under 35 U.S.C. 103(a) as being unpatentable over Inanoglu (US Patent 7486740 B2) in view of Hammerschmidt (US Publication 20040151146 A1) further in view of Walton et al. (US Publication 20050135318 A1).

In regards to claim 1, Inanoglu teaches in figure 4 a block diagram of transmit and receive chains at an access point 410 and a user terminal 450 in a MIMO system 400. Access point 410 transmit symbols Xdn are processed by a transmit chain 424 and transmitted from Nap antennas 428 (attaching Nt training symbols for Nt number of transmitting chains or antennas). At user terminal 450, Nap downlink signals are received by Nut Antennas 452 and processed by a receive chain 454 to obtain received symbols Ydn (attaching Nr training symbols for Nr number of receiving chains or antennas for reception). Since the downlink signals must be processed to obtain the received symbols, Inanoglu reads on attaching the Nr training symbols (see column 7, lines 42-50).

In further regards to claim 1, Inanoglu fails to teach receiving training symbols attached to a clear to transmit response. Hammerschmidt however, discloses the

above-mentioned limitation. Hammerschmidt discloses with regards to prior art figure 1 that training symbols may be inserted in preambles of OFDM packets (see paragraph 9 on page 1) and with regards to figure 13, shows channel reservation using OFDM service packets RTS and CTS where CTS packet 1304 has a preamble (see paragraph 85 on page 7).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to use an OFDM service packet such as a CTS with preamble inclusive of training symbols as disclosed by Hammerschmidt in the transmission system taught by Inanoglu. The motivation do so would be to derive channel state information for OFDM sub-channels and use the channel state information to process the OFDM packets received via the antennas (See Hammerschmidt, paragraph 11 on pages 1 and 2).

Furthermore, Hammerschmidt discloses the use of preambles in OFDM packets to transmit training symbols, only the CTS is shown to have a preamble (as the applicant noted in the remarks field 2/23/2009); the RTS is not shown to have a preamble. Inanoglu also fails to tech the above-mentioned feature. Walton however teaches the above-mentioned feature.

Walton teaches the use of PLCP header, legacy preamble and MAC frame formats in transmitting RTS/CTS frames (see paragraph 352 on page 27).

Therefore, it would have been obvious for one or ordinary skill in the art at the time the invention was made to in particular use the preamble in a RTS frame as taught by Walton for the transmission of training symbols inserted in the preamble of OFDM

packets as taught by Hammerschmidt along with the transmission system of Inanoglu. The motivation do so would be to derive channel state information for OFDM sub-channels and use the channel state information to process the OFDM packets received via the antennas (See Hammerschmidt, paragraph 11 on pages 1 and 2).

In regards to claims 11 and 12, transmit chain 424 includes Nap transmitter units for the Nap access point antennas and is characterized by a diagonal matrix $\underline{T}$ap with Nap complex gains for the Nap transmitter units (see column 7, lines 57-60) (transmitting the packet to a remote device as a training symbol via a select first of a plurality of antennas and transmitting the included training symbols to the remote device via a select second or more of the plurality of antennas to enable the remote device to perform training).

Furthermore, receive chain 434 includes Nap receiver units for the Nap access point antennas and is characterized by a diagonal matrix with complex gains for the receiver units. Pre-calibration may also be performed (receiving at least a packet from the remote device (since receive chain 434 receives from user 450), wherein the packet is used as a training symbol (since complex gain is calculated) and performing calibration of one or more transmit chains based at least in part, on channel performance information associated with the received training symbols) (see column 7, lines 60-67).

In regards to claim 13, Inanoglu teaches in figure 4 a block diagram of transmit and receive chains at an access point 410 and a user terminal 450 in a MIMO system 400. Access point 410 transmit symbols Xdn are processed by a transmit chain 424

and transmitted from Nap antennas 428 (attaching Nt training symbols for Nt number of transmitting chains or antennas). At user terminal 450, Nap downlink signals are received by Nut Antennas 452 and processed by a receive chain 454 to obtain received symbols Ydn (attaching Nr training symbols for Nr number of receiving chains or antennas for reception). Since the downlink signals must be processed to obtain the received symbols, Inanoglu reads on attaching the Nr training symbols (see column 7, lines 42-50).

In further regards to claim 13, Inanoglu fails to teach receiving training symbols attached to a clear to transmit response. Hammerschmidt however, discloses the above-mentioned limitation. Hammerschmidt discloses with regards to prior art figure 1 that training symbols may be inserted in preambles of OFDM packets (see paragraph 9 on page 1) and with regards to figure 13, shows channel reservation using OFDM service packets RTS and CTS where CTS packet 1304 has a preamble (see paragraph 85 on page 7).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to use an OFDM service packet such as a CTS with preamble inclusive of training symbols as disclosed by Hammerschmidt in the transmission system taught by Inanoglu. The motivation do so would be to derive channel state information for OFDM sub-channels and use the channel state information to process the OFDM packets received via the antennas (See Hammerschmidt, paragraph 11 on pages 1 and 2).

Furthermore, Hammerschmidt discloses the use of preambles in OFDM packets to transmit training symbols, only the CTS is shown to have a preamble (as the applicant noted in the remarks field 2/23/2009); the RTS is not shown to have a preamble. Inanoglu also fails to tech the above-mentioned feature. Walton however teaches the above-mentioned feature.

Walton teaches the use of PLCP header, legacy preamble and MAC frame formats in transmitting RTS/CTS frames (see paragraph 352 on page 27).

Therefore, it would have been obvious for one or ordinary skill in the art at the time the invention was made to in particular use the preamble in a RTS frame as taught by Walton for the transmission of training symbols inserted in the preamble of OFDM packets as taught by Hammerschmidt along with the transmission system of Inanoglu. The motivation do so would be to derive channel state information for OFDM sub-channels and use the channel state information to process the OFDM packets received via the antennas (See Hammerschmidt, paragraph 11 on pages 1 and 2).

In regards to claim 37, Inanoglu teaches in figure 4 a block diagram of transmit and receive chains at an access point 410 and a user terminal 450 in a MIMO system 400. Access point 410 transmit symbols Xdn are processed by a transmit chain 424 and transmitted from Nap antennas 428 (attaching Nt training symbols for Nt number of transmitting chains or antennas). At user terminal 450, Nap downlink signals are received by Nut Antennas 452 and processed by a receive chain 454 to obtain received symbols Ydn (attaching Nr training symbols for Nr number of receiving chains or antennas for reception). Since the downlink signals must be processed to obtain the

received symbols, Inanoglu reads on attaching the Nr training symbols (see column 7, lines 42-50).

In further regards to claim 37, Inanoglu fails to teach receiving training symbols attached to a clear to transmit response. Hammerschmidt however, discloses the above-mentioned limitation. Hammerschmidt discloses with regards to prior art figure 1 that training symbols may be inserted in preambles of OFDM packets (see paragraph 9 on page 1) and with regards to figure 13, shows channel reservation using OFDM service packets RTS and CTS where CTS packet 1304 has a preamble (see paragraph 85 on page 7).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to use an OFDM service packet such as a CTS with preamble inclusive of training symbols as disclosed by Hammerschmidt in the transmission system taught by Inanoglu. The motivation do so would be to derive channel state information for OFDM sub-channels and use the channel state information to process the OFDM packets received via the antennas (See Hammerschmidt, paragraph 11 on pages 1 and 2).

Furthermore, Hammerschmidt discloses the use of preambles in OFDM packets to transmit training symbols, only the CTS is shown to have a preamble (as the applicant noted in the remarks field 2/23/2009); the RTS is not shown to have a preamble. Inanoglu also fails to tech the above-mentioned feature. Walton however teaches the above-mentioned feature.

Walton teaches the use of PLCP header, legacy preamble and MAC frame formats in transmitting RTS/CTS frames (see paragraph 352 on page 27).

Therefore, it would have been obvious for one or ordinary skill in the art at the time the invention was made to in particular use the preamble in a RTS frame as taught by Walton for the transmission of training symbols inserted in the preamble of OFDM packets as taught by Hammerschmidt along with the transmission system of Inanoglu. The motivation do so would be to derive channel state information for OFDM sub-channels and use the channel state information to process the OFDM packets received via the antennas (See Hammerschmidt, paragraph 11 on pages 1 and 2).

In regards to claim 41, receive chain 434 includes Nap receiver units for the Nap access point antennas and is characterized by a diagonal matrix with complex gains for the receiver units. Pre-calibration may also be performed (receiving at least a packet from the remote device (since receive chain 434 receives from user 450), wherein the packet is used as a training symbol (since complex gain is calculated) and performing calibration of one or more transmit chains based at least in part, on channel performance information associated with the received training symbols) (see column 7, lines 60-67).

Claims 4 and 16 are rejected under 35 U.S.C. 103(a) as being unpatentable over Inanoglu (US Patent 7486740 B2) in view of Hammerschmidt (US Publication 20040151146 A1) further in view of Walton et al. (US Publication 20050135318 A1) further in view of Suzuki et al. (US Patent 7072409 B2).

In regards to claim 4, Inanoglu, Hammerschmidt and Walton in combination teach all the limitations of parent claim 1. Neither of the above-mentioned references however teach the transmission occurring sequentially. Suzuki however, teaches the above-mentioned limitation (see column 5, lines 28-35) where radio waves are radiated sequentially form the transmitting antenna elements TXA1 (see figures 1 and 3).

Therefore, it would have been obvious for one of ordinary skill in the art at the time the invention was made to incorporate the sequential transmission as taught by Suzuki into the transmission system of Li. The motivation to do so would be to properly reconstruct a transmitted signal in the event of a distorted direct path between a receiving and a transmitting antenna.

In regards to claim 16, Inanoglu, Hammerschmidt and Walton in combination teach all the limitations of parent claim 13. Neither of the above-mentioned references however teach the transmission occurring sequentially. Suzuki however, teaches the above-mentioned limitation (see column 5, lines 28-35) where radio waves are radiated sequentially form the transmitting antenna elements TXA1 (see figures 1 and 3).

Therefore, it would have been obvious for one of ordinary skill in the art at the time the invention was made to incorporate the sequential transmission as taught by Suzuki into the transmission system of Li. The motivation to do so would be to properly reconstruct a transmitted signal in the event of a distorted direct path between a receiving and a transmitting antenna.

Claims 5-7 and 17-18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Inanoglu (US Patent 7486740 B2) in view of Hammerschmidt (US Publication

20040151146 A1) further in view of Walton et al. (US Publication 20050135318 A1) further in view of Suzuki et al. (US Patent 7072409 B2) further in view of Weber et al. (US Patent 7212788 B2).

In regards to claims 5-7, Inanoglu, Hammerschmidt, Walton and Suzuki in combination claims 1 and 4. Inanoglu, Hammerschmidt, Walton and Suzuki however fail to particularly teach providing comparing a performance metric at a receiver to select the best transmit antenna, where the performance metric is SNR. Weber on the other hand, teaches the above-mentioned limitations

In regards to claims 5-6, Weber teaches in prior art figure 1, a baseband/mixer unit 140 that includes processing for comparing the number of packet errors/SNR for each of antenna (providing a performance metric at a receiver when compared against other transmit antenna options) (see column 1, lines 42-46). The antenna with the least number of errors or the highest SNR is selected for broadcast (selecting the antenna with the best performance metric at the receiver, where the performance metric is SNR) (see column 1, lines 46-47).

Therefore, it would have been obvious to one skilled in the art at the time the invention was made to incorporate the selection of a transmit antenna based on the received SNR at taught by Weber in the teachings of Inanoglu, Hammerschmidt, Walton and Suzuki. The motivation to do so would be to allow for selection of an antenna with the best performance.

In regards to claim 7, figure 4 in Inanoglu is inclusive of transmit chain 424.

In regards to claims 17, Inanoglu, Hammerschmidt, Walton and Suzuki in combination claims 13 and 16. Inanoglu, Hammerschmidt, Walton and Suzuki however fail to particularly teach providing comparing a performance metric at a receiver to select the best transmit antenna, where the performance metric is SNR. Weber on the other hand, teaches the above-mentioned limitations

Weber teaches in prior art figure 1, a baseband/mixer unit 140 that includes processing for comparing the number of packet errors/SNR for each of antenna (providing a performance metric at a receiver when compared against other transmit antenna options) (see column 1, lines 42-46). The antenna with the least number of errors or the highest SNR is selected for broadcast (selecting the antenna with the best performance metric at the receiver, where the performance metric is SNR) (see column 1, lines 46-47).

Therefore, it would have been obvious to one skilled in the art at the time the invention was made to incorporate the selection of a transmit antenna based on the received SNR at taught by Weber in the teachings of Inanoglu, Hammerschmidt, Walton and Suzuki. The motivation to do so would be to allow for selection of an antenna with the best performance.

In regards to claim 18, figure 4 in Inanoglu is inclusive of transmit chain 424.

Claims 8 and 19-20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Inanoglu (US Patent 7486740 B2) in view of Hammerschmidt (US Publication 20040151146 A1) further in view of Walton et al. (US Publication 20050135318 A1)

further in view of Suzuki et al. (US Patent 7072409 B2) further in view of Weber et al. (US Patent 7212788 B2) further in view of Corbett et. al (US Patent 7239894 B2).

In regards to claim 8, Inanoglu, Hammerschmidt, Walton, Suzuki and Weber in combination teach all the limitations of the parent claims. Neither of the above-mentioned references however teaches the concept of using a separate subset of transmission antennas for the handshaking and the data packets.

Corbett however teaches the above-mentioned concept with respect to omni-directional antenna 203 and directional antenna 204. Omni-directional antenna 203 can be used to receive a data notification signal indicating that a wireless device has data to send (RTS). The control module 205, then causes a directional beam of directional antenna 204 to be directed towards the location of the wireless device (see column 8, lines 49-64). The control module 205 can also cause antenna 203 to transmit a location request. Thus two different antennas are used to receive/transmit control information and payload information separately.

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate the concept of using two different antennas to transmit control and data information as taught by Corbett with the techings of Inanoglu, Hammerschmidt, Walton, Suzuki and Weber. The motivation to do so would be to detect signal strength associated with the received communication.

In regards to claim 19, Inanoglu, Hammerschmidt, Walton, Suzuki and Weber in combination teach all the limitations of the parent claims. Neither of the above-

mentioned references however teaches the concept of using a separate subset of transmission antennas for the handshaking and the data packets.

Corbett however teaches the above-mentioned concept with respect to omni-directional antenna 203 and directional antenna 204. Omni-directional antenna 203 can be used to receive a data notification signal indicating that a wireless device has data to send (RTS). The control module 205, then causes a directional beam of directional antenna 204 to be directed towards the location of the wireless device (see column 8, lines 49-64). The control module 205 can also cause antenna 203 to transmit a location request. Thus two different antennas are used to receive/transmit control information and payload information separately.

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate the concept of using two different antennas to transmit control and data information as taught by Corbett with the techings of Inanoglu, Hmmerschmidt, Walton, Suzuki and Weber. The motivation to do so would be to detect signal strength associated with the received communication.

In regards to claim 20, Inanoglu shows in figure 4, transmit chain 424.

Claim 40 is rejected under 35 U.S.C. 103(a) as being unpatentable over Inanoglu (US Patent 7486740 B2) in view of Hammerschmidt (US Publication 20040151146 A1) further in view of Walton et al. (US Publication 20050135318 A1) further in view of Weber et al. (US Patent 7212788 B2).

In regards to claim 40, Inanoglu, Hammerschmidt and Walton teach all the limitations of parent claim 37. Inanoglu, Hammerschmidt and Walton however fail to

particularly teach providing comparing a performance metric at a receiver to select the best transmit antenna, where the performance metric is SNR. Weber on the other hand, teaches the above-mentioned limitations

Weber teaches in prior art figure 1, a baseband/mixer unit 140 that includes processing for comparing the number of packet errors/SNR for each of antenna (providing a performance metric at a receiver when compared against other transmit antenna options) (see column 1, lines 42-46). The antenna with the least number of errors or the highest SNR is selected for broadcast (selecting the antenna with the best performance metric at the receiver, where the performance metric is SNR) (see column 1, lines 46-47).

Therefore, it would have been obvious to one skilled in the art at the time the invention was made to incorporate the selection of a transmit antenna based on the received SNR at taught by Weber in the teachings of Inanoglu, Hammerschmidt and Walton. The motivation to do so would be to allow for selection of an antenna with the best performance.

Response to Arguments

Applicant's arguments filed 2/23/2009 have been considered but are moot in view of the new ground(s) of rejection.

The use of Hammerschmidt is only relied on to teach a CTS with a preamble inclusive of training symbol in view of the applicant's arguments.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to JAY P. PATEL whose telephone number is (571)272-3086. The examiner can normally be reached on Mon.-Thurs.: 8:00 a.m.- 6:30 p.m..

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Edan Orgad can be reached on (571)272-7884. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Edan Orgad/

Supervisory Patent Examiner, Art Unit 2419